Installation manual

Simrad ES333-7CD

200 kHz split-beam deep water transducer

Simrad ES333-7CD

Installation manual

This document provides a general description of how to install the Simrad ES333-7CD Split-beam transducer. The information must be regarded as general guidelines and recommendations only. The installation shipyard must design and manufacture installation hardware to fit the ES333-7CD transducer on each individual towed body.

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15 January 2009

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to install, operate or work on the equipment.
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Support

If you require maintenance on your Simrad product contact your local dealer. You can also contact us using the following address: simrad.support@simrad.com. If you need information about our other products, visit www.simrad.com. On our web site you will also find a list of our dealers and distributors.

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ABOUT THIS MANUAL

Purpose

The purpose of this installation manual is to provide generic descriptions and illustrations allowing the reader to understand the basic principles for echo sounder transducer installation.

About the information provided in this document

The information in this document must be regarded as general guidelines and recommendations only. The installation shipyard must design and manufacture installation hardware to fit each individual transducer and vessel.

Approval by maritime authorities

Whenever required, the installation shipyard must also have the installation approved by the applicable maritime authorities.

Additional information

For additional detailed information about the transducer to be installed, refer to the documentation provided with the transducer. Drawings and descriptions can also be obtained from http://www.simrad.com.

SIMRAD ES333-7CD

The purpose of this manual is the provide the basic information required to install the Simrad ES333-7CD Split-beam transducer.

Transducer and documents order numbers

- Simrad ES333–7CD: **312902**
- Product specification: **329782**
- Outline dimensions: **318747**
- Mounting ring: **871-204449**
- Clamping ring: **871-204451**

Note

Note that although drawings are provided to explain the installation principles, the manufacturer of the towed body must provide the final drawings required to fit the transducer.

Transducer installation

The next chapters in this manual provide general guidelines for transducer installation. The drawings specific for the ES333-7CD transducer are located in the *Drawing file* on page 20.

Technical specifications

Refer to the ES333-7CD product specification.

Additional parts provided for installation

The following items can be supplied by Simrad to facilitate installation:

- Mounting ring: **ES2–204464**
- Clamping ring: **ES2–200879**
- Transducer cable (for extension): **642–078215**

Note

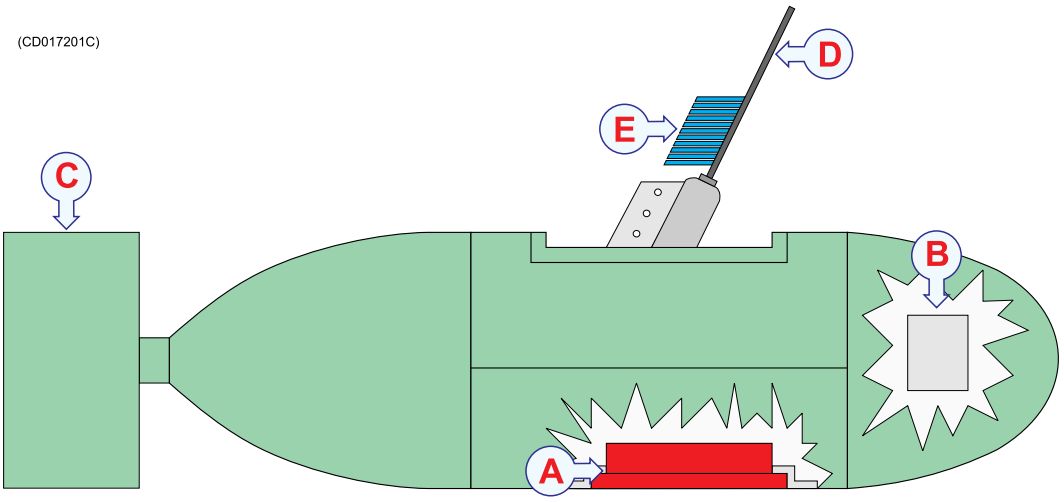
This cable is NOT suitable as a tow cable!

- The following parts must (if required) be provided by the installation shipyard:
  - Male bulkhead connector: 8–pin Burton 5500 Series (www.burtonee.com)

TOWED BODY DESIGN

The towed body used to hold the ES333-7CD Split-beam transducer is not provided by Simrad. The design and manufacturing of such a body must be made by your own organisation, or by a third party you wish to engage to do this. During the design phase, the following considerations must be made.

Figure 1 Example, towed body



A *Transducer mounted through the body plating by means of a mounting ring*

B *Watertight compartment with transceiver electronics*

C *Tail fin*

D *Tow line with built-in cables for power supply, control and data transfer (ethernet)*

E *Fairings*

Location of transceiver electronics

If your towed body design comprises a watertight compartment, you may choose to install the transceiver circuitry inside the towed body. In order to do so, you must install watertight sockets on the bulkhead in order to connect the transducer cable(s), control and data transfer (Ethernet) and operating power. By using a this arrangement, you avoid the signal loss you may experience using a long transducer cable.

Depth

The upper water layers of the sea contain a myriad of small air bubbles created by the breaking waves. In heavy seas the uppermost 5 to 10 metres may be air-filled, with the highest concentrations near the surface. Air bubbles absorb and reflect

the sound energy, and may in worst cases block the sound transmission totally. Therefore, design the towed body so that it can operate in deep water.

Caution

Observe the maximum operational depth of the transducer. Do not exceed this limitation.

Do not allow the towed body to hit the sea bed. This may inflict permanent damage to the transducer(s).

Noise from protruding objects on the body

Objects protruding from the towed body, such as zinc anodes, sonar transducers or even a rudder or a keel, may generate turbulence and flow noise. Holes and pipe outlets are also possible noise sources, as these may act as resonant cavities amplifying the flow noise at certain frequencies. Do not place an echo sounder transducer in the vicinity of such objects, and especially not close behind them. For the same reason, it is very important that the body area adjacent to the transducer face is as smooth and level as possible. Even traces of sealing compound, sharp edges, protruding bolts or bolt holes without filling compound will create noise.

Inclination of the transducer face

Ideally, the transducer face should be mounted in parallel with the sea surface when the towed body is in normal trim, as this will provide the most accurate echo information. However, it is also very important that the water flow over the transducer face is laminar. In order to ensure laminar flow, the transducer face may be tilted slightly upwards in relation to the water flow. This allows the flowing water to meet the face directly, and assures laminar flow. The inclination angle must however be determined carefully. The angle must be small on transducers with narrow beam angles. As a rule of thumb, mount transducers with beam angles smaller than seven degrees with minimum inclination angle. The smaller beam angle your transducer has, the smaller the inclination angle can be. Make sure that you do not mount the transducer with a negative inclination angle. This may cause turbulence under the transducer face, and reduced echo sounder performance.

HOW TO INSTALL THE TRANSDUCER

Installation on a towed body

Transducers designed to withstand large water pressure are provided for use in towed bodies. The recommended installation method is through the hull plating hull using mounting and clamping rings. The installation arrangement on the towed body must be designed by the manufacturer of the towed body to fit its shape and characteristics.

Use mounting and clamping rings whenever provided

Circular transducers may be provided with mounting and clamping rings, or with drawings to allow for local production of these. The mounting ring is welded to the hole in the towed array, while the clamping ring fits around the edge of the transducer body. Bolts through the clamping ring into the mounting ring will then secure the transducer between them. Note that all split-beam transducers use direction guides to allow correct mounting.

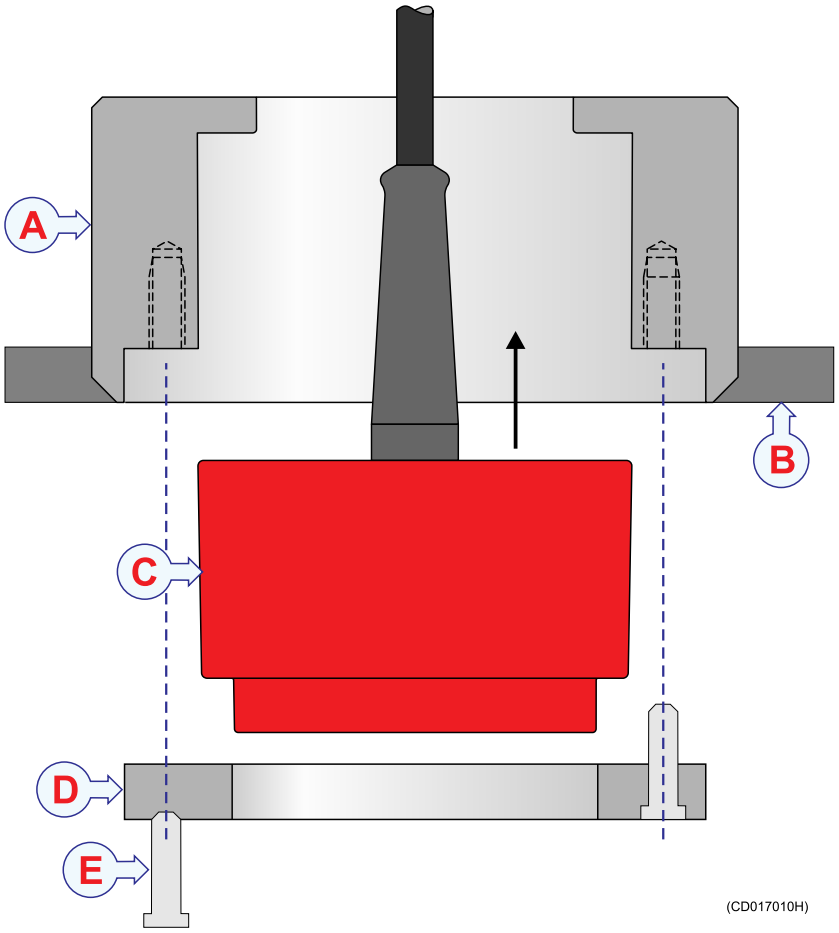
Smooth surface is important

Mounting screws or bolts must not be extruding from the vehicle. Ensure that the surface of the transducer face, the vehicle, the vehicle plating and putty around the transducer is as even and smooth as possible. Obstructions on these surfaces will create problems with the water flow.

Example: Installation of small transducer

The illustration below shows the installation principle of a small circular transducer using clamping and mounting rings.

Figure 2 Installation principle, small transducer



A *Mounting ring*

B *Hull plating on towed body*

C *Transducer*

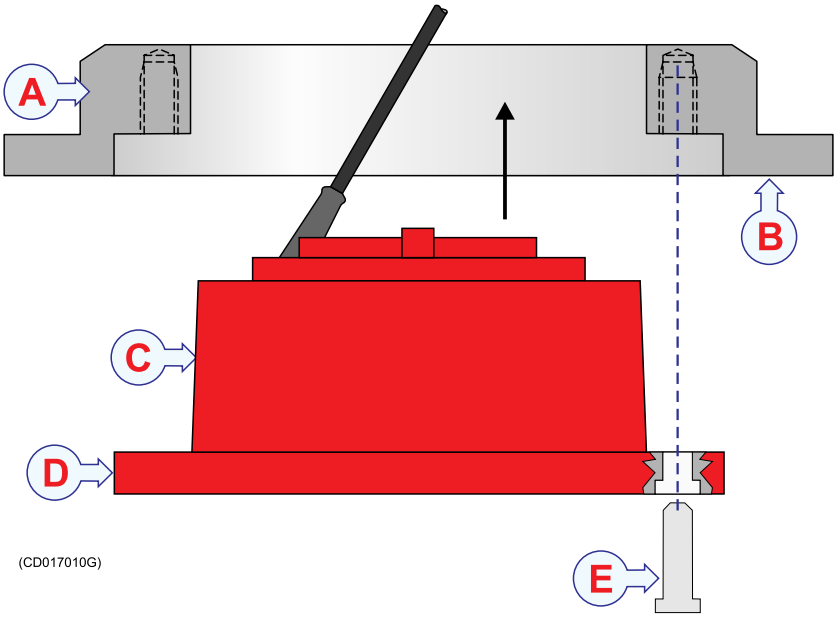
D *Clamping ring*

E *Bolt*

Example: Installation of medium and large transducers

The illustration below shows the installation principle of a medium or large transducers. Note that a clamping ring is not required, as the transducer body is shaped to facilitate this function.

Figure 3 Installation principle, medium and large transducers



A *Mounting ring*

B *Hull plating on towed body*

C *Transducer*

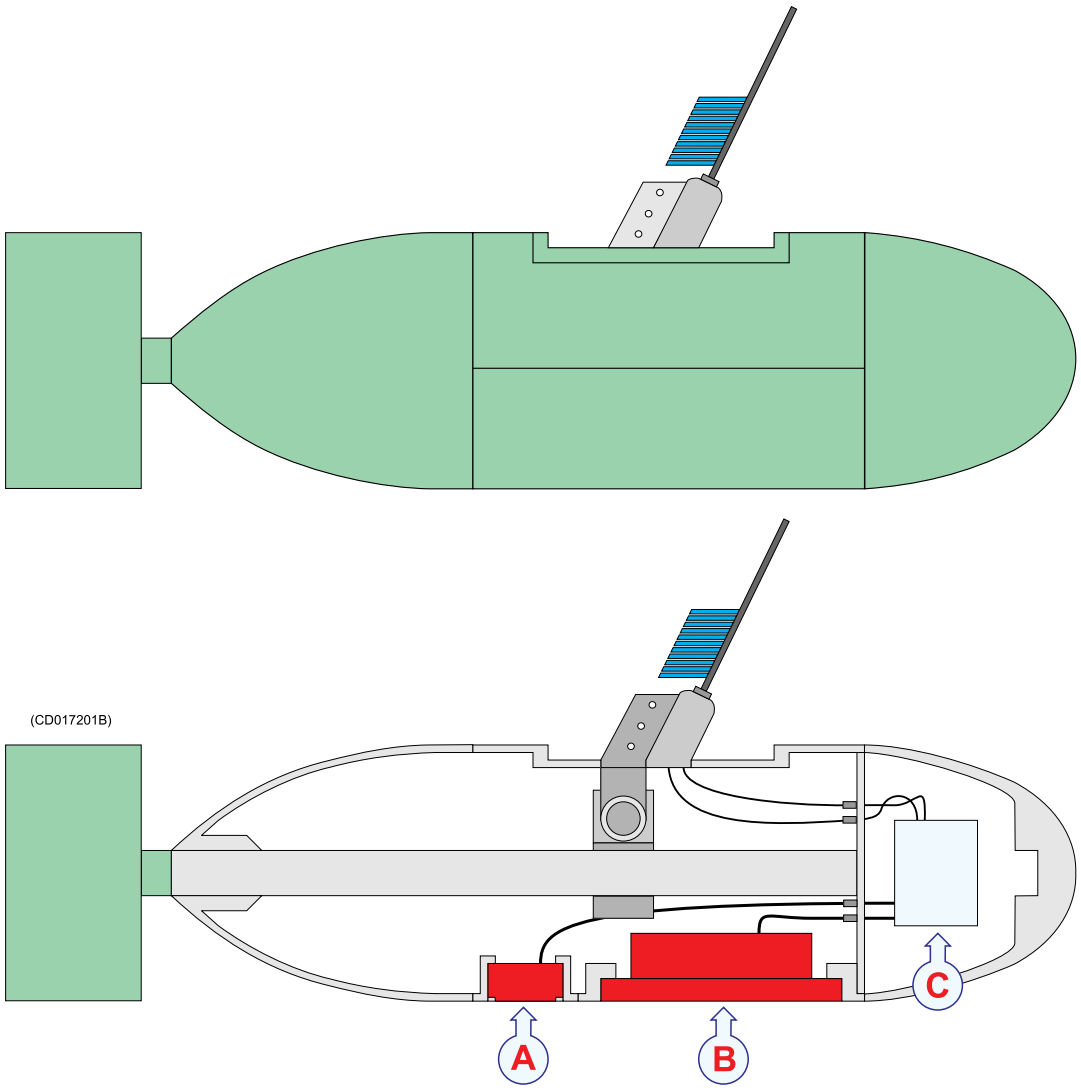
D *"Clamping ring" functionality facilitated by transducer body*

E *Bolt*

Example: Dual transducer arrangement in towed body

The illustration below shows a typical through the hull installation of small and large circular transducers on a towed body.

Figure 4 Dual transducer arrangement



A *Small transducer*

B *Medium or larger transducer*

C *Electronic equipment in watertight compartment*

TRANSDUCER HANDLING AND MAINTENANCE

You MUST observe the following rules for handling, maintenance and painting.

Topics

- *Rules for transducer handling* on page 13
- *Approved anti-fouling paints* on page 13
- *Using self-locking taps* on page 14

Rules for transducer handling

Note

Do not *lift the transducer by the cable.*

Do not *expose the transducer to direct sunlight.*

Do not *expose the transducer to excessive heat.*

Transport protection

Some transducers are delivered with a cover plate on the face for protection during transport. Let this plate stay on as long as possible, but do not forget to remove it before the vessel goes into the sea.

Painting the transducer face

An anti-fouling paint may be applied to the transducer face. Because some paint types may be aggressive to the polyurethane in the transducer face, please consult Simrad's list of approved paints. See *Approved anti-fouling paints* on page 13.

Cleaning the transducer face

Whenever opportunity arise, for example when the vessel is dry docked, the transducer face may be cleaned for shells and other marine fouling. Be careful not to make cuts in the transducer face. Use a piece of soft wood or a very fine grade emery paper.

Special rules for acoustic windows

Arctic tanks have acoustic windows made of polycarbonate. These must neither be painted nor cleaned with chemicals.

Approved anti-fouling paints

This is Simrad's list of approved antifouling paints on polyurethane transducer housing.

Jotun

Head office address: P.O.Box 2021, N-3248 Sandefjord, Norway

Website: www.jotun.com.

1 Racing

2 Non-stop

3 Safeguard Universal primer (125 micron) with Antifouling SeaQuantum Ultra (125 micron)

4 Antifouling Seaguardian

International Marine Coatings

Address: World-wide offices

Wesite: www.international-marine.com.

1 Intersleek tie coat + 425 FCS

- BXA386/BXA390/BXA391 Grey
- HKA563/HKA570/HKA571 Yellow
- Mix BXA386, BXA390 and BXA391 first, then apply. When dry, mix HKA563, HKA570 and HKA571, apply.

2 Intersmooth 360 Ecoloflex SPC

3 Micron Ekstra

Hempel IFA Coatings

Head office address: Hempel A/S, Lundtoftevej 150, Kgs. Lyngby, DK-2800 Copenhagen, Denmark

Website: www.hempel.com.

1 Hempel A/F Classic 76550

Note

Refer to the manufacturer's documentation and data sheets for a complete procedure.

Using self-locking taps

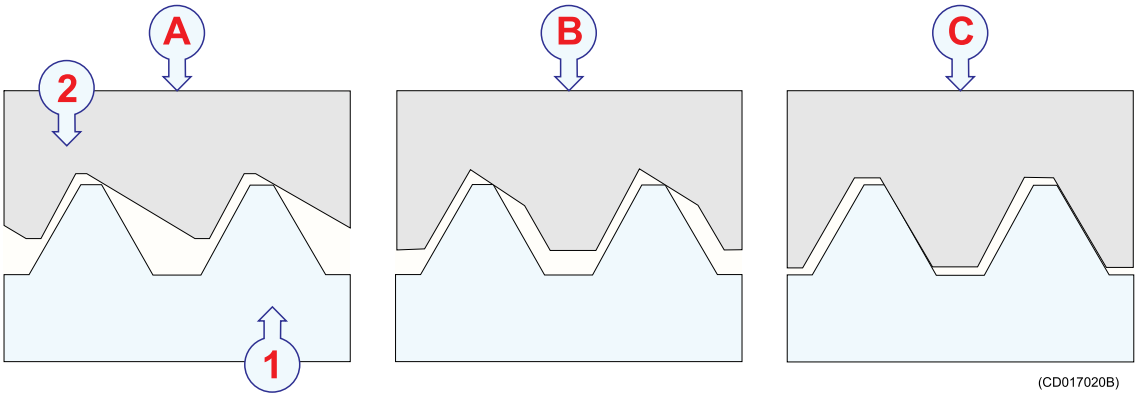
Screw connections are generally made so that they can be loosened again. However, accidental loosening, especially under dynamic stress, must be avoided. For this reason it is often necessary to use additional locking devices. These are often expensive, they can be used once only, or react critically to temperature changes.

Introduction to Emuge self-locking threads

Emuge self-lock is a bolt design with an integrated locking feature. Standard metric bolts are used. The internal thread provides a self-locking connection, which can be used repeatedly. It is not

necessary to involve a secondary locking device (e.g. chemical, nylon or mechanical). The **Emuge self-lock** bolts withstand vibrations better than standard (metric) threads, because the thread contact stops the sideways movement. The special design of the internal thread profile also provides a more even distribution of the tightening stress over the whole thread length. The assembly is just as easy as with a normal (metric) thread. There is no general applicable standard (e.g. DIN standard) for the **Emuge self-lock** thread.

Figure 5 Example, internal and external threads



A *Emuge's saw-tooth profile up to pitch P ≤ 0.7 mm*

B *Emuge's saw-tooth profile up to pitch P ≥ 0.7 mm*

C *Standard thread*

1 *External thread*

2 *Internal thread*

The advantages of using **Emuge self-lock** thread include:

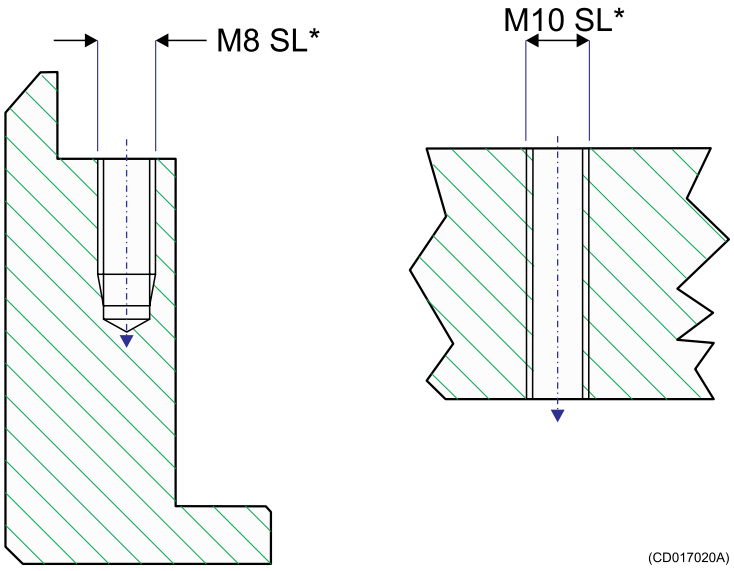
- The thread locking feature is integrated in the internal thread
- Modified profile with ramp surface in the direction of stress
- 30 degree ramp surface provides self-locking effect
- Easy assembly
- No assembly errors (forgetting the locking device) possible
- Use of standard external threads (screws) with tolerance class "medium"
- Even distribution of stress over the whole thread length
- No stripping of threads
- Economically efficient locking system, no additional components are necessary
- Undiminished holding power even under dynamic stress
- Repeated loosening and re-tightening without loss of function

- Internal threads can be produced with **Emuge** taps, cold forming taps or thread mills
- Larger thread hole diameters, i.e. increased tool life for threading tools
- Larger tolerances for thread hole diameters

Drawing standard

Whenever self-locking threads are required, this is shown on the technical drawing. In the case of tapping through holes, the arrow at the end of the center line illustrates the screw-in direction of the bolt.

Figure 6 Drawing examples, self-locking thread



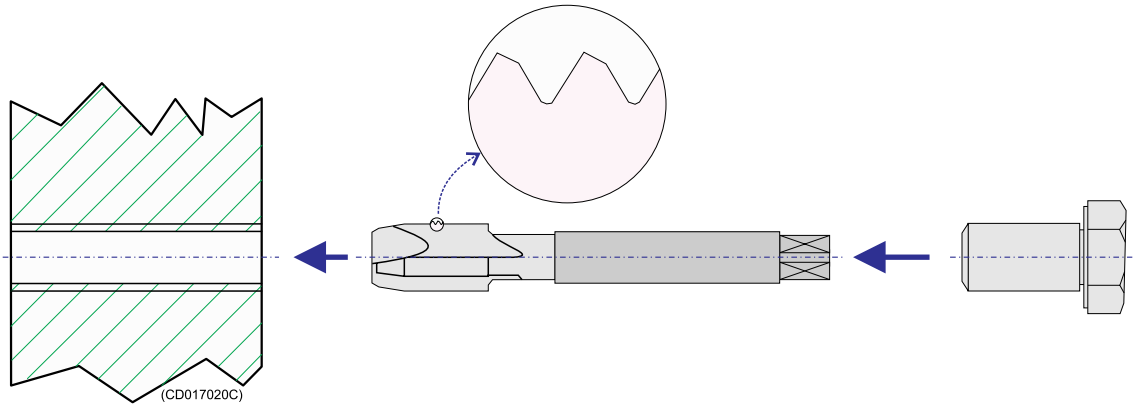
The drawing is normally provided with the following text (or similar):

Note: The self-lock threads marked with SL must be made in accordance with procedure 842–202125. Drill diameters for threads differ from standard. Self-lock taps can be supplied by Simrad.*

Taps

The pretension locking thread self–lock (taps) from manufacturer **Emuge** must be used.

Figure 7 Example of use



Note

*In the case of tapping through holes it is important that the profile of the **Emuge self-lock** threads is in the correct direction compared with the entering direction of the bolt.*

Gauge

Use **Emuge self-lock** gauges. Note that the gauge must be used in the correct direction.

Self-lock taps provided by Simrad

The following self-lock taps are on stock at Simrad, and can be ordered from us.

Threads	Drill diameter for threads	Part.no
M6	ø5.2	700-078838
M8	ø7.0	700-078531
M10	ø8.8	700-078408
M12	ø10.7	700-078409
M16	ø14.5	700-078410

Supplier and manufacturer

Norwegian supplier is:

Tingstad AS, P.O.Box 83, Kalbakken, 0902 Oslo, Norway

http://www.tingstad.no

Manufacturer is:

EMUGE-Werk Richard Glimpel, Nurnberger Strasse 96-100, D-90607 Lauf, Germany

http://www.emuge.de

TRANSDUCER CABLE SPLICING

If you need to cut or lengthen the transducer cable, you must splice it correctly. The cable between the junction box and the transceiver must then be supplied by Simrad, and this must be the same type as used on the transducer(s). To splice the cable, use a metal junction box with EMC cable glands and a terminal block. The terminal block must provide solid fastening of the cable ends as well as sufficient insulation between the wires. We recommend that the cable screen is connected to the junction box chassis using the EMC cable glands, but if you do this, the junction box chassis must not be connected to vessel's ground.

Note

Do not solder the wires together with only electrical tape for insulation. This will result in electrical noise and reduced operational performance.

Do not connect the cable screen to the vessel's ground.

STEEL CONDUIT

Why use steel conduits with a towed body?

It is strongly recommended to lay a steel conduit from the connection point of the tow cable to the echo sounder transceiver, and to pull the transducer cable through this conduit. There are several reasons for this.

- It will make it easier at a later stage to replace the cable.
- Noise and interference from other electrical equipment is greatly reduced.

With a steel conduit the installation will satisfy the EU regulations for EMC interference. Without a steel conduit, there is a risk of reduced echo sounder performance.

Steel conduits qualities and shielding

The steel conduit must be unbroken and watertight from the transducer to above the water line. From there, the cable can be pulled further, or a junction box can be installed to facilitate further connections. Note that the steel conduit must act as a continuous electrical screen all the way. To ensure proper shielding, the conduit must be electrically connected to the echo sounder transceiver chassis.
Steel conduit dimensions:

- minimum 35 mm inner diameter
- minimum 6 mm wall thickness (4.5 mm if galvanised)

More that one transducer cable?

If two or more transducers are installed close to each other it is possible to pull their cables in the same steel conduit, provided the conduit diameter is increased accordingly. However, for easy replacement it is recommended that each transducer has its own steel conduit.

DRAWING FILE

This chapter contains relevant drawings related to the electrical and physical installation of the ES333-7CD Split-beam transducer.

Note

The mechanical drawings are for information and guidance only. They are not in scale. All dimensions are in mm unless otherwise is noted.

The original installation drawings are available on PDF and/or AutoCad format. Visit www.simrad.com to download.

Topics

- *Echo sounder connections* on page 20
- *Outline dimensions and installation drawings* on page 23

Echo sounder connections

Observe the following information related to electrical connection of the ES333-7CD Split-beam transducer.

Topics

- *Splicing the transducer cable* on page 20
- *General Purpose Transceiver (GPT) wiring* on page 21
- *General Purpose Transceiver (GPT) transducer plug assembly* on page 22

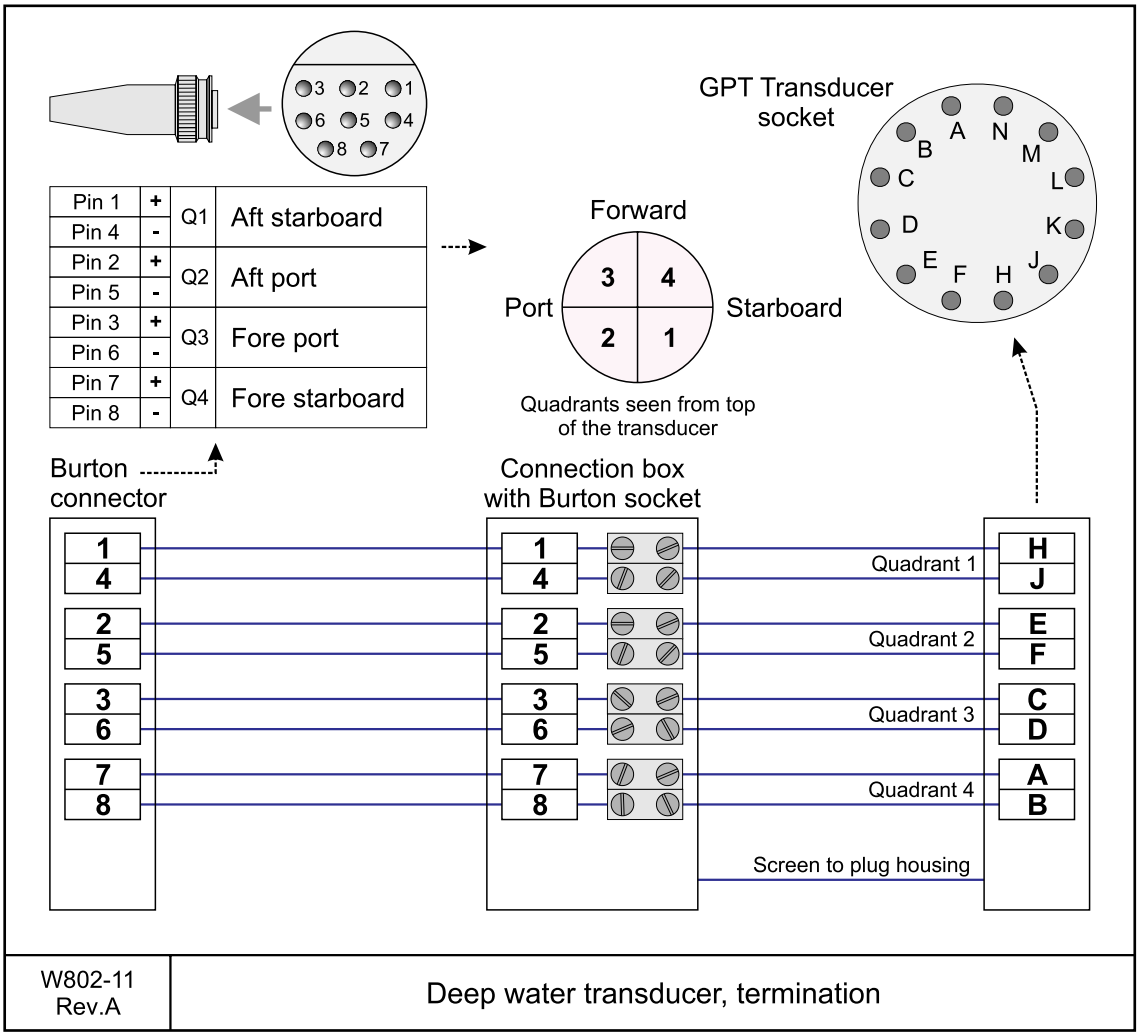
Splicing the transducer cable

If you need to splice the transducer cable, it is very important to use the correct cable, and to avoid ground loops. We strongly recommend the use of a junction box. We also recommend that you install the transducer cable in a steel conduit.

Related topics

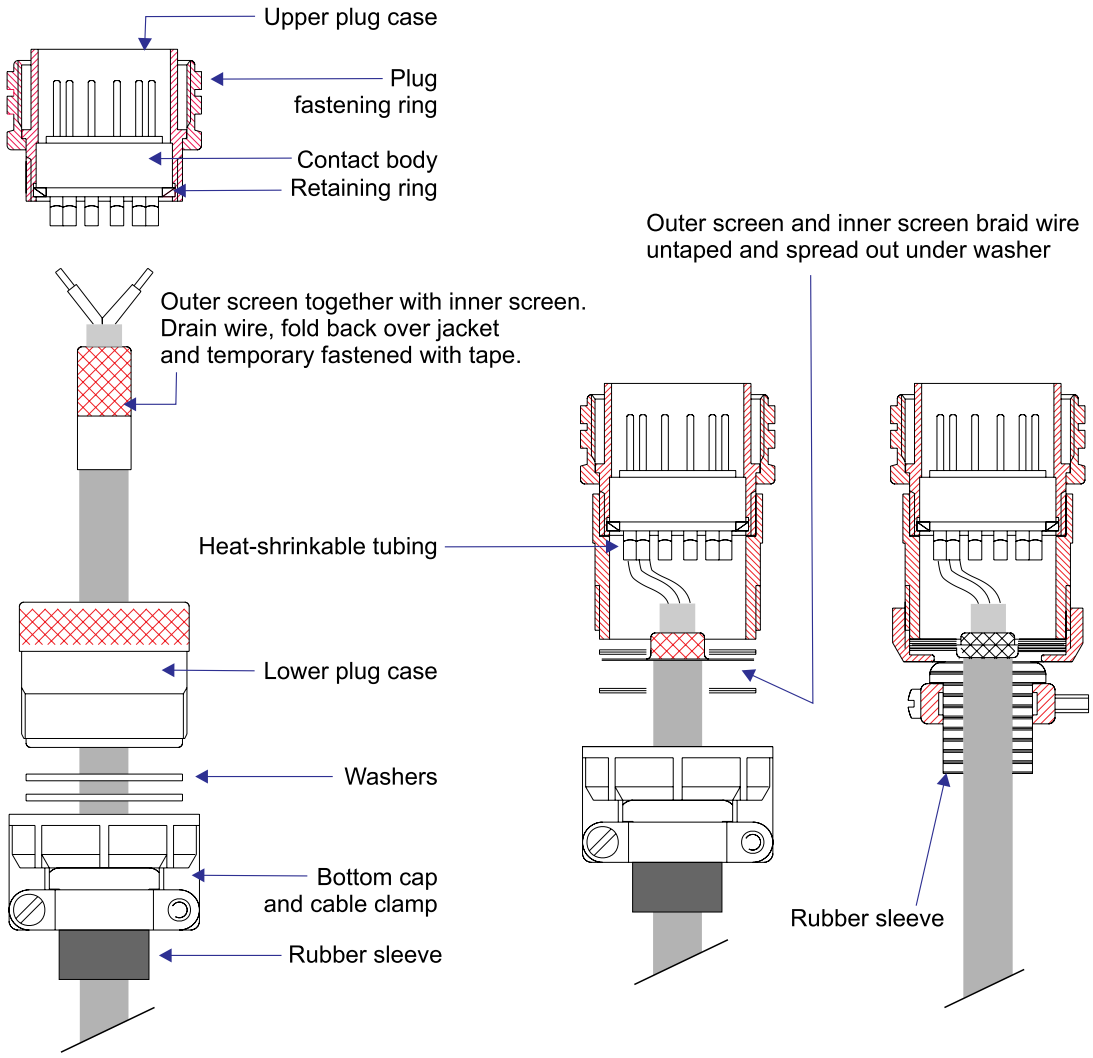
- *Transducer cable splicing* on page 18
- *Steel conduit* on page 19
- *General Purpose Transceiver (GPT) transducer plug assembly* on page 22

General Purpose Transceiver (GPT) wiring



W802-11 Rev.A	Deep water transducer, termination

General Purpose Transceiver (GPT) transducer plug assembly


Upper plug case
Plug fastening ring
Contact body
Retaining ring
Outer screen and inner screen braid wire untaped and spread out under washer
Outer screen together with inner screen. Drain wire, fold back over jacket and temporary fastened with tape.
Heat-shrinkable tubing
Lower plug case
Washers
Bottom cap and cable clamp
Rubber sleeve
Rubber sleeve

Note:
All measurements are in mm.
The drawing is not in scale.

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Outline dimensions and installation drawings

Note

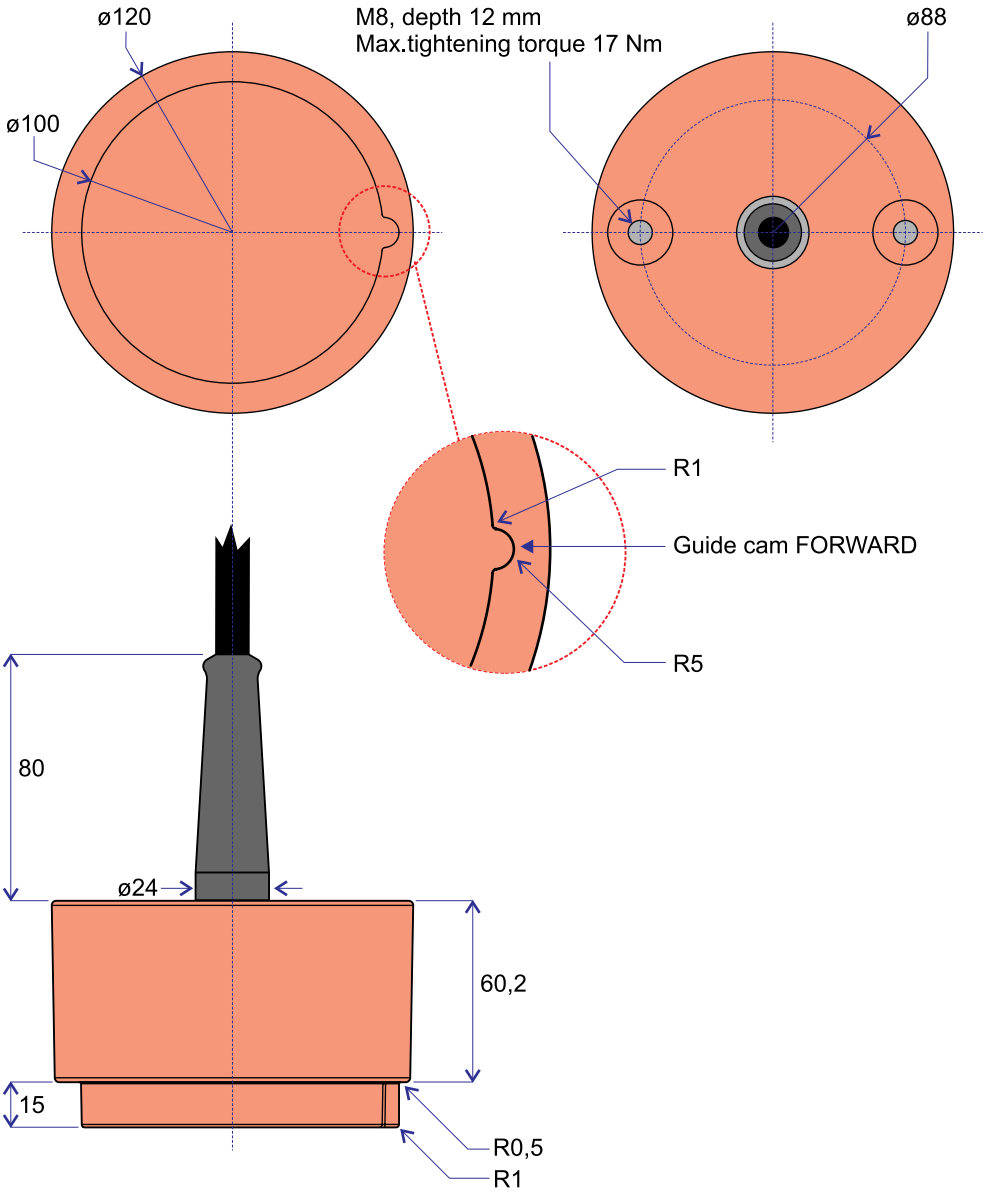
Observe the maximum torque (17 Nm) when the transducer is bolted into the mounting ring!

Topics

- *Outline dimensions [318747]* on page 24
- *Mounting ring [204449]* on page 25
- *Clamping ring [204451]* on page 27

Outline dimensions [318747]

Radii without dimensions are 1,5 mm
Weight without cable: 4,2 kg
Standard cable lengths:
- ES333-7C = 20 m
- ES333-7CD = 1,5 m



Note:
All measurements are in mm
The drawing is not in scale

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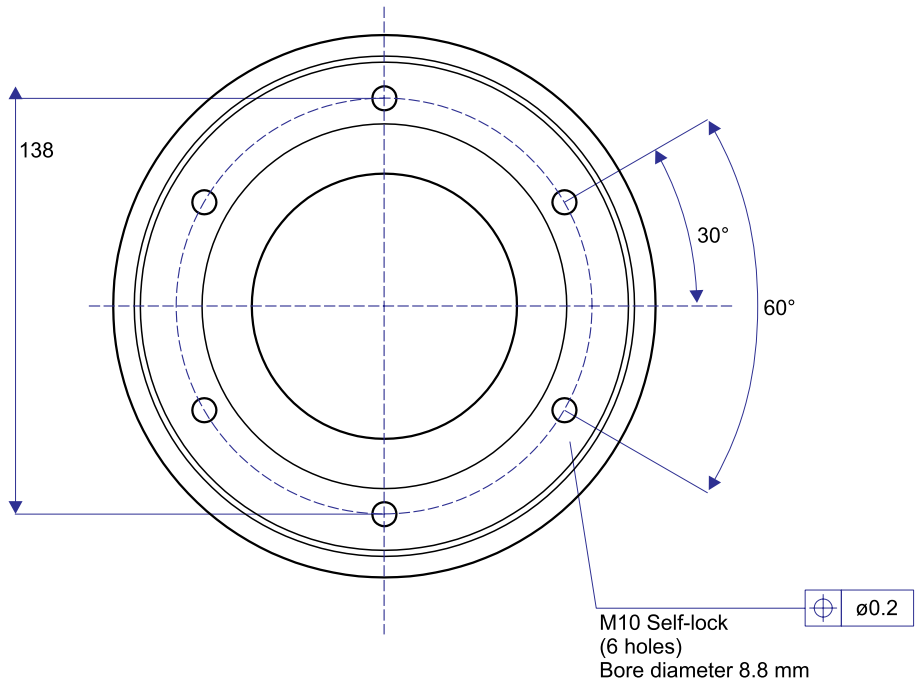
Mounting ring [204449]



Material:
Steel tube, ST.52-3N (DIN 17121), ø193.7/ø83.7 x100

Surface treatment:
Sand blasted to SA 2.5, one coating of red ferric oxide primer

M10 Self-lock taps:
Refer to specific description. Self-lock taps can be provided by Simrad.

Note:
All measurements are in mm.
The drawing is not in scale.

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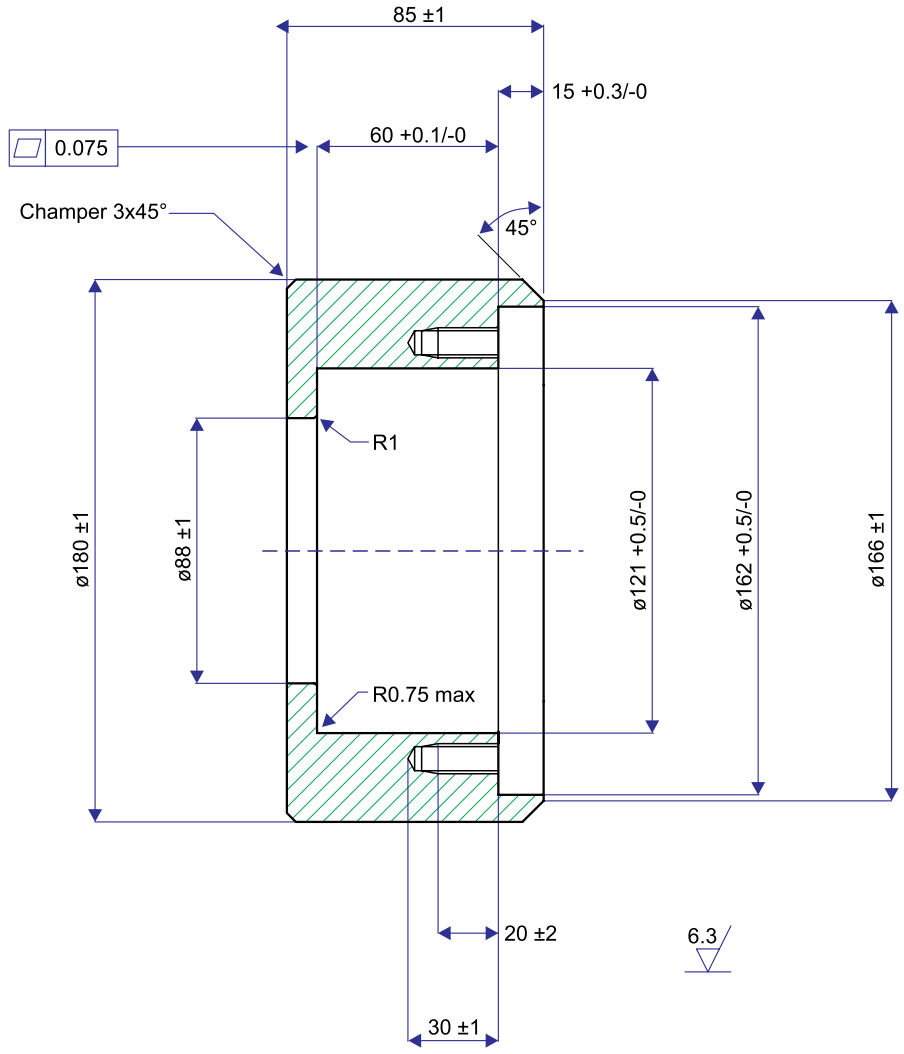

Note:
All measurements are in mm.
The drawing is not in scale.

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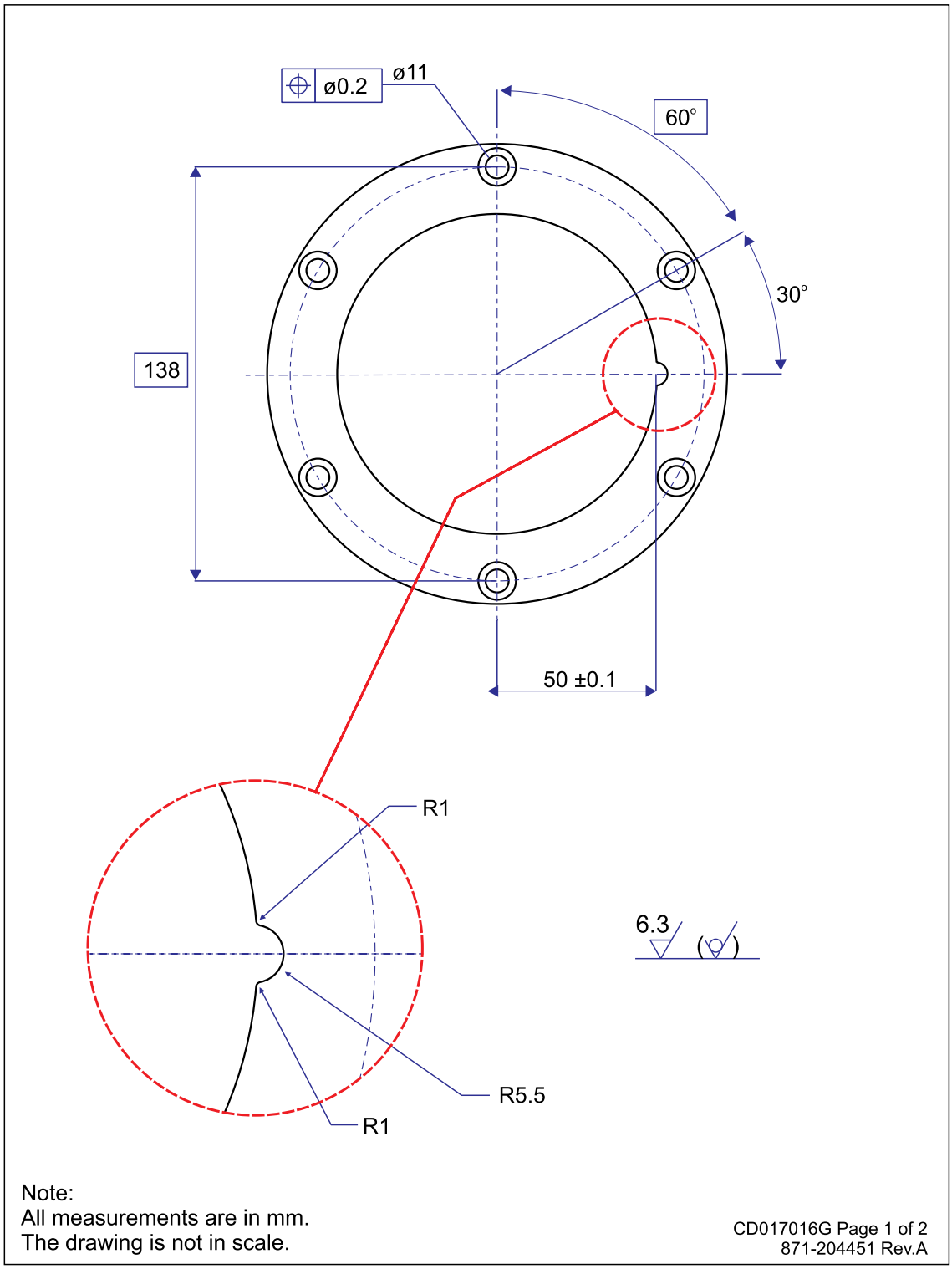
Clamping ring [204451]



Note:
All measurements are in mm.
The drawing is not in scale.

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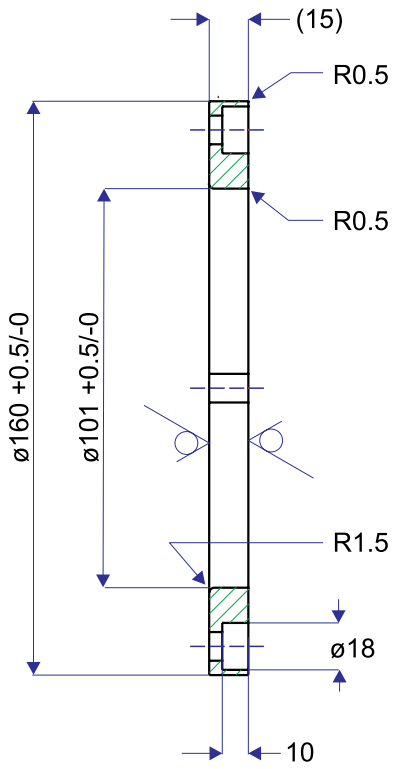

Material: 15 mm steel plate, St37/St52

Note:
All measurements are in mm.
The drawing is not in scale.

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